

Claims

Sub A1 [c1]

A method of controlling a vehicle comprising:

- inputting an intended driving demand to a vehicle motion control subsystem,
- the intended driving demand requesting a vehicle behavior modification;
- providing a plurality of coordinator subsystems;
- providing at least one actuator control subsystem for each coordinator subsystem;
- outputting actuator capabilities of the at least one actuator control subsystem to an associated one of the plurality of coordinator subsystems;
- outputting coordinator capabilities of each coordinator subsystem to the vehicle motion control subsystem;
- calculating at least one coordinator demand signal with the vehicle motion control subsystem, the at least one coordinator demand signal being determined according to the coordinator capabilities and the intended driving demand;
- outputting the at least one coordinator demand signal to at least one of the coordinator subsystems;
- calculating at least one actuator demand signal with each of the at least one of the coordinator subsystems, the at least one actuator demand signal being determined according to the actuator capabilities and the at least one coordinator demand signal outputted to the at least one of the coordinator subsystems; and
- outputting the at least one actuator demand signal to the at least one actuator control subsystem;

wherein a combination of each at least one actuator demand signal provides directions for the at least one actuator control subsystem to perform the vehicle behavior modification of the intended driving demand.

[c2]

The method of controlling a vehicle of claim 1, further comprising:

- receiving at least one driver input from a driver of the vehicle;
- providing at least one active assist program having at least one active input, the at least one active assist program having an on setting wherein the at least one active assist program outputs at least one active input and an off setting

wherein the at least one active assist program does not output at least one active input; and
receiving at least one active input from the at least one active assist program if the at least one active assist program is in the on setting;
wherein a combination of the at least one driver input and the at least one active input define the intended driving demand if the at least one active assist program is in the on setting and if the driver of the vehicle does not override the at least one active assist program; and
wherein the at least one driver input defines the intended driving demand if the at least one active assist program is in the off setting or the driver of the vehicle overrides the at least one active assist program.

[c3] The method of controlling a vehicle of claim 2, further including:
inputting environmental data into the at least one active assist program.

[c4] The method of controlling a vehicle of claim 1, wherein:
the plurality of coordinator subsystems include a suspension coordinator subsystem, a steering coordinator subsystem and a drive train and brakes coordinator subsystem.

[c5] The method of controlling a vehicle of claim 1, wherein:
the at least one coordinator demand signal comprises a plurality of coordinator demand signals.

[c6] The method of controlling a vehicle of claim 1, further including:
inputting actuator state measurements into the at least one actuator control subsystem;
wherein the actuator capabilities of the at least one actuator control subsystem are determined according to the actuator state measurements.

[c7] The method of controlling a vehicle of claim 6, wherein:
the coordinator capabilities for the associated one of the plurality of coordinator subsystems are determined according to the actuator capabilities of the at least one actuator control subsystem outputting the actuator capabilities to the associated one of the plurality of coordinator subsystems.

[c8]

A vehicle control system comprising:

a vehicle motion control subsystem having a control input and a control output, the control input communicating an intended driving demand to the vehicle motion control subsystem, the intended driving demand requesting a vehicle behavior modification;

a plurality of coordinator subsystems, each coordinator subsystem including a coordinator input and a coordinator output, each coordinator subsystem communicating coordinator capabilities of the coordinator subsystem to the system input of the vehicle motion control subsystem; and

at least one actuator control subsystem for each coordinator subsystem, each actuator control subsystem having an actuator output communicating capabilities of the actuator control subsystem to the coordinator input of an associated one of the plurality of coordinator subsystems;

wherein the vehicle motion control subsystem calculates at least one coordinator demand signal, the at least one coordinator demand signal being determined according to the coordinator capabilities and the intended driving demand;

wherein the vehicle motion control subsystem outputs the at least one coordinator demand signal to the coordinator input of at least one of the coordinator subsystems;

wherein each coordinator subsystem calculates at least one actuator demand signal, the at least one actuator demand signal being determined according to the actuator capabilities and the at least one coordinator demand signal outputted to the at least one of the coordinator subsystems;

wherein each coordinator subsystem outputs the at least one actuator demand signal to at least one actuator control subsystem; and

wherein a combination of each at least one actuator demand signal provides directions for the at least one actuator control subsystem to perform the vehicle behavior modification of the intended driving demand.

[c9]

The vehicle control system of claim 8, further including:

a driver subsystem for receiving inputs from a driver of the vehicle; and

at least one active assist program having at least one active input, the at least

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one active assist program having an on setting wherein the at least one active assist program outputs at least one active input and an off setting wherein the at least one active assist program does not output at least one active input; wherein a combination of the at least one driver input and the at least one active input define the intended driving demand if the at least one active assist program is in the on setting and if the driver of the vehicle does not override the at least one active assist program; and wherein the at least one driver input defines the intended driving demand if the at least one active assist program is in the off setting or the driver of the vehicle overrides the at least one active assist program.

- [c10] The vehicle control system of claim 9, wherein:
the at least one active assist program receives environmental data.
- [c11] The vehicle control system of claim 8, wherein:
the plurality of coordinator subsystems include a suspension coordinator subsystem, a steering coordinator subsystem and a drive train and brakes coordinator subsystem.
- [c12] The vehicle control system of claim 8, wherein:
the at least one coordinator demand signal comprises a plurality of coordinator demand signals.
- [c13] The vehicle control system of claim 8, wherein:
actuator state measurements are input into the at least one actuator control subsystem; and
the actuator capabilities of the at least one actuator control subsystem are determined according to the actuator state measurements.
- [c14] The vehicle control system of claim 13, wherein:
the coordinator capabilities for the associated one of the plurality of coordinator subsystems are determined according to the actuator capabilities of the at least one actuator control subsystem outputting the actuator capabilities to the associated one of the plurality of coordinator subsystems.
- [c15] A method of controlling a vehicle comprising:

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receiving at least one driver input from a driver of the vehicle;
providing at least one active assist program having at least one active input, the
at least one active assist program having an on setting wherein the at least one
active assist program outputs at least one active input and an off setting
wherein the at least one active assist program does not output at least one
active input;
inputting an intended driving demand for implementing a vehicle behavior
modification into a vehicle motion control subsystem;
providing an implementation subsystem; and
outputting at least a portion of the intended driving demand from the vehicle
motion control subsystem to the implementation subsystem;
wherein the intended driving demand is derived from a combination of the at
least one driver input and the at least one active input if the at least one active
assist program is in the on setting and if the driver of the vehicle does not
overrule the at least one active assist program, otherwise the intended driving
demand is derived from the at least one driver input.

[c16]

The method of controller a vehicle of claim 15, wherein:
the implementation subsystem includes a plurality coordinator subsystems and
at least one actuator control subsystem for each coordinator subsystem; and
further including the steps of:
outputting actuator capabilities of the at least one actuator control subsystem
to an associated one of the plurality of coordinator subsystems;
outputting coordinator capabilities of each coordinator subsystem to the vehicle
motion control subsystem;
calculating at least one coordinator demand signal with the vehicle motion
control subsystem, the at least one coordinator demand signal being
determined according to the coordinator capabilities and the intended driving
demand;
the step of outputting at least a portion of the intended driving demand
includes outputting the at least one coordinator demand signal to at least one
of the coordinator subsystems;
calculating at least one actuator demand signal with each of the at least one of

the the coordinator subsystems, the at least one actuator demand signal being determined according to the actuator capabilities and the at least one coordinator demand signal outputted to the at least one of the coordinator subsystem; and
outputting the at least one actuator demand signal to the at least one actuator control subsystem;
wherein the at least one actuator demand signal provides directions for the at least one actuator control subsystem to perform the vehicle behavior modification of the intended driving demand.

[c17] The method of controlling a vehicle of claim 16, further including:
inputting actuator state measurements into the at least one actuator control subsystem;
wherein the actuator capabilities of the at least one actuator control subsystem are determined according to the actuator state measurements.

[c18] The method of controlling a vehicle of claim 17, wherein:
the coordinator capabilities for the associated one of the plurality of coordinator subsystems are determined according to the actuator capabilities of the at least one actuator control subsystem outputting the actuator capabilities to the associated one of the plurality of coordinator subsystems.

[c19] The method of controlling a vehicle of claim 16, wherein:
the plurality of coordinator subsystems include a suspension coordinator subsystem, a steering coordinator subsystem and a drive train and brakes coordinator subsystem.

[c20] The method of controlling a vehicle of claim 16, further including:
the at least one coordinator demand signal comprises a plurality of coordinator demand signals.

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